

apparatus according to the present invention, the plasma discharge space and film deposition process space on either side of the dividing plate are only connected through the holes provided in the dividing plate, but as proposed in a previous patent application (U.S. Patent Application No. 09/435,625), if these holes satisfy the above-mentioned condition ( $uL/D > 1$ ), then it is possible to prevent the precursor gas introduced into the film deposition process space from diffusing back towards the plasma discharge space.

[0054] Note that in each of the above-mentioned embodiments, if the holes 8, 108, 208, 308 through which the radicals pass are formed so as to satisfy the condition  $uL/D > 1$ ,

where  $u$  is the gas flow rate inside these holes,  $L$  is the effective length of the holes (in the above-mentioned embodiments, this length is equivalent to the thickness of dividing plate), and  $D$  is the gas interdiffusion coefficient (the gas interdiffusion coefficient of the precursor gas and the gas introduced in the plasma discharge space at the holes), then this is advantageous because it is possible to prevent the reverse diffusion of precursor gas introduced into film deposition process space 26 towards plasma discharge space 25.